An averaging method for a semilinear equation

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We discuss an abstract averaging method for a semilinear equation

\[ Lx = \varepsilon N(x, \varepsilon), \]

where \( L \) is a Fredholm mapping of index zero, and \( N \) is a nonlinear operator. The applicability of the method for periodic solutions to \( n \)-th order differential equation and nonlocal nonlinear boundary problems is discussed. The talk is based on a joint paper